SAND AND GRAVEL DEPOSITS

Individual wells yield as much as 2,200 gal/min from sand and gravel deposits. Water-saturated sand and gravel deposits constitute the most productive aquifers. During the melting of the last glacial ice sheet, soil and rock fragments were transported, sorted, and deposited by glacial meltwater as stratified sand and gravel in stream channels and as fine sand, silt, and clay in ponds and lakes. The greatest known saturated thickness of these deposits is 140 feet.

The transmissivities shown on the map are based on analyses of lithologic logs, aquifer tests, and specific capacities. Transmissivity estimates based on lithologic logs were made for more than 1,150 wells and borings fully or partly penetrating stratified glacial deposits. Transmissivity was calculated from specific-capacity data for 36 wells by methods of Hurr, 1966; Narasimhan, 1967; Meyer, 1963; and Walton, 1962.

Transmissivity of unconsolidated deposits ranges from less than 10 ft²/d for thin deposits of silt and clay to more than 14,000 ft²/d for large stratified thickness of coarse sand and gravel. Estimated transmissivity and well yield at any location may be more or less than estimated because of appreciable horizontal and vertical changes in lithology over short distances, characteristic of stratified glacial deposits. Exploratory test drilling is necessary to determine the exact location and extent of the best water-bearing deposits. Aquifer tests are necessary to evaluate the water-yielding capability of an aquifer at any location.

BEDROCK

The study area is underlain by a variety of crystalline bedrock types. Wells drilled in bedrock for domestic water supplies are commonly 100 to 300 feet deep and generally yield 2 to 10 gal/min. The maximum recorded yield from a bedrock well in the entire basin is 225 gal/min.

GROUND WATER QUALITY

Most ground water is of good quality and satisfactory for domestic and municipal use. In general, ground water is soft to moderately hard (hardness, 0-120 mg/L as CaCO3) and mildly acid to slightly alkaline (pH, 6.9-7.5).

Iron, or manganese, or both in excess of EPA (U.S. Environmental Protection Agency, 1975) recommended limits for drinking water (0.3 mg/L and 0.25 mg/L, respectively) were present in water from some wells. Water is likely to contain excess concentrations of these metals where the water is chemically reducing. This condition is common under and adjacent to swampy areas containing organic material.

Chloride concentrations are generally less than 10 mg/L; however, many wells have elevated chloride concentrations, which are presumably a result of highway salting and an increase in the discharge of wastewater. Chlorided concentrations in ground water exceeding EPA's recommended limit of 250 mg/L for drinking water have been caused by the outside storage of deicing salt. These elevated concentrations have resulted in the closing of a municipal well field in Sudbury and in the contamination of private wells in Carlisle.

Complex organic compounds in low concentrations considered unsafe for human consumption have been detected in ground water at several locations. Benzene, toluene, trichloroethylene, chloroform, and chlorobenzene are examples of hydrocarbons detected in ground water in the area. The presence of these chemicals in ground water has resulted from faulty methods of use, storage, and disposal. The presence of these chemicals has resulted in the closing of at least three public-supply wells in Acton and Hudson.

EXPLANATION
AQUIFER AREAS AND CHARACTERISTICS

STRATIFIED GLACIAL DEPOSITS

- Transmissivity less than 1,350 ft²/d (potential well yield Generally less than 100 gal/min).
- Transmissivity 1,350-4,000 ft²/d (potential well yield 100 to 300 gal/min).
- Transmissivity greater than 4,000 ft²/d (potential well yield greater than 300 gal/min).
- Areas where transmissivity may be greater than indicated by the color shown.

These deposits consist of stratified and sorted sand, gravel, cobbles, boulders, silt, and clay. Colors on map indicate estimated aquifer transmissivity. Transmissivity is the rate at which water of prevailing kinematic viscosity id transmitted through a unit width of the aquifer under a unit hydraulic gradient, expressed in feet squared per day (ft²/d—see note). Potential well yields are based on transmissivity and are for properly designed and constructed individual wells at sites that have been located after exploratory drilling.

TILL DEPOSITS

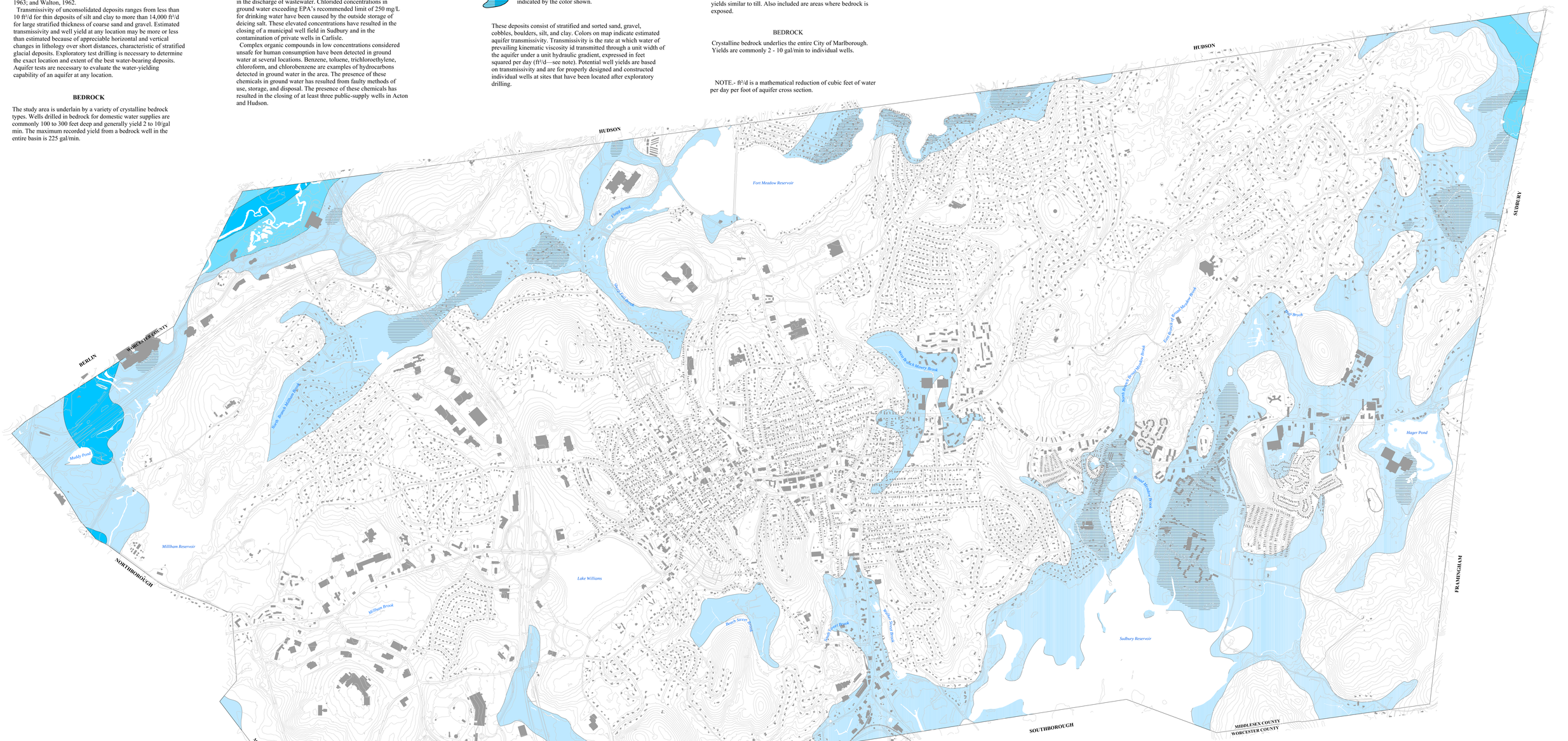
- Transmissivity, 0-100 ft²/d (potential well yield Generally less than 10 gal/min).

Till is a poorly sorted mixture of clay, silt, sand, gravel, and cobbles, with a low transmissivity and thus is not a good aquifer. however, where saturated, till may provide low yields sufficient to supply singly-family homes from dug wells. Some minor stratified glacial deposits are included in the areas mapped as till because they have little or no saturated thickness and have potential well yields similar to till. Also included are areas where bedrock is exposed.

BEDROCK

Crystalline bedrock underlies the entire City of Marlborough. Yields are commonly 2 - 10 gal/min to individual wells.

NOTE.- ft²/d is a mathematical reduction of cubic feet of water per day per foot of aquifer cross section.



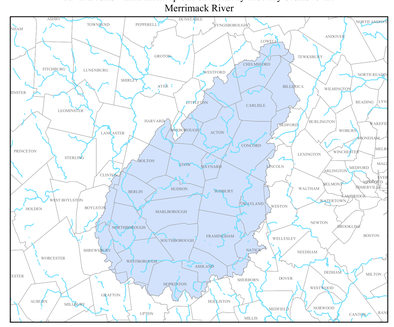
MAP OF
HYDROLOGY AND WATER RESOURCES
CITY OF MARLBOROUGH, MASS.
2002

0.25 0.125 0 0.25 0.5 0.75 1 1.25 1.5 1.75 Miles

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1988

RONALD M LaFRENIERE COMMISIONER DPW
PATRICK M CLANCY CITY ENGINEER

The City of Marlborough lies within the Sudbury, Assabet and Concord River Basins which make up one of the many tributary basins to the Merrimack River



Reference Map of the Sudbury, Assabet and Concord River Basins

NOTE: SOURCES FOR THIS MAP ARE AERIAL PHOTOGRAPHY COMPLETED BY THE CITY IN APRIL 2000. PHOTOGRAMETRIC COMPILATION WAS COMPLETED BY CHAS. H. SELLS, INC. TO AN ACCURACY THAT MEETS 1" = 40' SCALE MAPPING STANDARDS. INFORMATION ALSO COMPILED FROM HYDROLOGIC INVESTIGATION ATLAS, PUBLISHED BY THE UNITED STATES GEOLOGICAL SURVEY, 1985.

City of Marlborough Massachusetts GIS